What is claimed is:

1. A fuel injector for an internal combustion engine comprising:

a housing to be installed in the engine with a portion of the housing exposed outside the engine;

an actuator including an electrically deformable element which works to be deformed in response to input of an electric signal for opening and closing a spray hole selectively; and

a structural element installing said actuator in said housing detachably.

2. A fuel injector as set forth in claim 1, wherein said housing has a length and an end portion thereof exposed outside the engine, further comprising a nozzle needle disposed within said housing in alignment with said actuator so as to be moved in a lengthwise direction of said housing by the deformation of said actuator to open and close the spray hole selectively, and wherein said structural element secures said actuator so that said actuator is detachable from the end portion of said housing opposite said nozzle needle across said actuator.

3. A fuel injector as set forth in claim 1, wherein said actuator has a length with a first end oriented toward the portion of said housing exposed outside the engine, further comprising a connector coupled integrally with the first end of said actuator for establishing an electric connection between said actuator and a power source.

4. A fuel injector as set forth in claim 1, wherein said housing has formed therein a vertical chamber which has an opening oriented to a first end of said housing exposed outside the engine, said structural element includes a fastening member which retains said actuator detachably within the vertical chamber, and further comprising a nozzle needle disposed in alignment with said actuator within a chamber formed in said housing opposite the first end across the vertical chamber so as to be moved in a lengthwise direction of said housing by the deformation of said actuator to open and close the spray hole selectively.

5. A fuel injector as set forth in claim 4, wherein said actuator has a length with a first end oriented toward the first end of said housing, further comprising a connector installed detachably in the opening of said vertical chamber for establishing an electric connection between said actuator and a power source.

6. A fuel injector as set forth in claim 3, said connector includes a connector body which is coupled integrally with said actuator and has retains therein leads connecting with said actuator in an electrically insulating fashion.

7. A fuel injector as set forth in claim 5, said connector includes a connector body which is coupled integrally with said actuator and has retains therein leads connecting with said actuator in an

electrically insulating fashion.

8. A fuel injector as set forth in claim 4, wherein said actuator has a length with a first end oriented toward the first end of said housing, and further comprising a spacer disposed between a flange coupled with the first end of said actuator and a shoulder formed in said housing for adjusting a lengthwise location of said actuator within said vertical chamber.

9. A fuel injector as set forth in claim 4, wherein said fastening member is fastened to the opening of said vertical chamber in said housing to hold said actuator detachably within the vertical chamber, and further comprising a positioning means for positioning said actuator within said vertical chamber without being subjected to torque or unbalanced load arising from fastening of said fastening member.

10. A fuel injector as set forth in claim 9, wherein said actuator has a length with a first end oriented toward the first end of said housing, further comprising a connector coupled with the first end of said actuator for establishing an electric connection between said actuator and a power source, said connector including an electric terminal portion and a connector body extending from a surface of the electric terminal portion, and wherein said fastening member is implemented by a retaining nut through which the connector body extends, said retaining nut being installed in the opening of said

A5 vertical chamber with an outer end facing the surface of the electric terminal portion of said connector through a gap of 5 to 10mm so that a portion of the connector body is exposed outside said retaining nut.

11. A fuel injector as set forth in claim 1, wherein said structural element is implemented by one of a screw and a structural member joined to said housing by one of staking, welding, and bonding.

12. A fuel injector as set forth in claim 11, wherein a joint of the structural member and said housing is more fragile than any other portions.

13. A fuel injector as set forth in claim 11, further comprising at least one fragile portion formed on said housing for facilitating ease of cutting or breaking up said housing for withdrawing said actuator.

14. A fuel injector as set forth in claim 1, wherein said electrically deformable element is implemented by a piezoelectric device designed to expand and contract in response to the input of the electric signal, said piezoelectric device being made up of a stack of piezoelectric layers and electrode layers each interposed between adjacent two of said piezoelectric layers.

15. A fuel injector for an internal combustion engine comprising:

a hollow cylindrical housing having a first and a second opening formed in opposed ends thereof, respectively;

an actuator disposed within said housing, said actuator including an electrically deformable element which works to be deformed in response to input of an electric signal;

a first plate installed on one of the ends of said housing to seal the first opening hermetically; and

a second plate installed on the other end of said housing to seal the second opening hermetically, said second plate being so coupled to said housing as to transform the deformation of said electrically deformable element of said actuator into a stroke of a needle for opening and closing a spray hole selectively.

16. A fuel injector as set forth in claim 15, wherein said second plate is coupled to said housing so as to be displaced in response to the deformation of said electrically deformable element to produce the stroke of the needle.

17. A fuel injector as set forth in claim 15, wherein said second plate is coupled to said housing so as to be deformed elastically in response to the deformation of said electrically-deformable element to produce the stroke of said needle.

18. A fuel injector as set forth in claim 16, wherein said housing includes a bellows which expands and contracts following the deformation of said electrically deformable element.

19. A fuel injector as set forth in claim 15, further comprising a piston coupled at an end thereof to said electrically deformable element so as to move following deformation of said electrically deformable element within said cylindrical housing, and wherein said second plate is a diaphragm coupled to said housing in contact with the other end of said piston.

20. A fuel injector as set forth in claim 15, further comprising a piston coupled at an end thereof to said electrically deformable element so as to move following deformation of said electrically deformable element within said cylindrical housing, said piston having a rod, wherein said second plate is a diaphragm coupled to said housing in contact with an end of the rod of said piston, and further comprising an annular seat member installed within the second opening of said cylindrical housing through which the rod of said piston extends and a spring member disposed on said seat member to exert a given pressure on said electrically deformable member in a lengthwise direction thereof.

21. A fuel injector as set forth in claim 15, wherein said cylindrical housing has a bellows formed on the end in which the second opening is defined, and wherein said second plate is a diaphragm coupled to an end of the bellows to close the second opening.

22. A fuel injector as set forth in claim 15, wherein said cylindrical housing is so designed as to extend following the deformation of said electrically deformable element, wherein at least two of said cylindrical housing, said first plate, and said second plate are formed integrally with each other, and wherein said electrically deformable element is isolated from fluid within said fuel injector.

23. A fuel injector as set forth in claim 15, wherein said electrically deformable element is implemented by a piezoelectric device designed to expand and contract in response to the input of the electric signal, said piezoelectric device being made up of a stack of piezoelectric layers and electrode layers each interposed between adjacent two of said piezoelectric layers.

24. A fuel injector for an internal combustion engine comprising:

a hollow cylindrical housing;

an actuator disposed within said housing, said actuator including an electrically deformable element which works to expand and contract selectively in a lengthwise direction thereof in response to input of an electric signal;

a piston coupled at an end thereof to said electrically deformable element in alignment therewith so as to move following the expansion and contraction of said electrically deformable element; and

an extensible member in which said piston is disposed, said extensible member extending in a lengthwise direction thereof so as

to allow said piston to move to displace a needle for opening and closing a spray hole selectively, said extensible member being coupled to said housing in alignment therewith in a direction of expansion and contraction of said electrically deformable element.

25. A fuel injector as set forth in claim 24, wherein said extensible member is implemented by a bellows.

26. A fuel injector as set forth in claim 24, further comprising a plate joined to the other end of said piston, and wherein if a minimum diameter of said cylindrical housing is defined as *A*, a minimum diameter of said plate is defined as *B*, and a maximum diameter of said extensible member is defined as *C*, at least one of relations of $A > C$ and $B > C$ is satisfied.

27. A fuel injector as set forth in claim 24, wherein the end of said piston coupled said electrically deformable element is disposed within said cylindrical housing, and wherein if a maximum clearance between the end of said piston and an inner wall of said cylindrical housing is defined as *d*, and a minimum clearance between said piston and an inner wall of said extensible member is defined as *e*, a relation of $d < e$ is satisfied.

28 A fuel injector as set forth in claim 24 further comprising a first plate joined to a first end of said cylindrical housing and a second plate jointed to a second end of said cylindrical housing

opposite the first end, wherein at least two of said cylindrical housing, said extensible member, said first plate, and said second plate are formed integrally with each other, and wherein said electrically deformable element is isolated from fluid within said fuel injector.

29. A fuel injector as set forth in claim 24, wherein said electrically deformable element is implemented by a piezoelectric device designed to expand and contract in response to the input of the electric signal, said piezoelectric device being made up of a stack of piezoelectric layers and electrode layers each interposed between adjacent two of said piezoelectric layers.